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**NEW SPECIES OF DICRAEUS (DIPTERA, CHLOROPIDAE) FROM
NEW GUINEA AND NEW IRELAND***

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Abstract

The genus *Dicraeus* is recorded from New Guinea and New Ireland. Eight new species, *D. gressitti*, *D. antennatus*, *D. novaeiberniae*, *D. longisurstylus*, *D. kundiawae*, *D. oboensis*, *D. hirsutus* and *D. niger* are described.

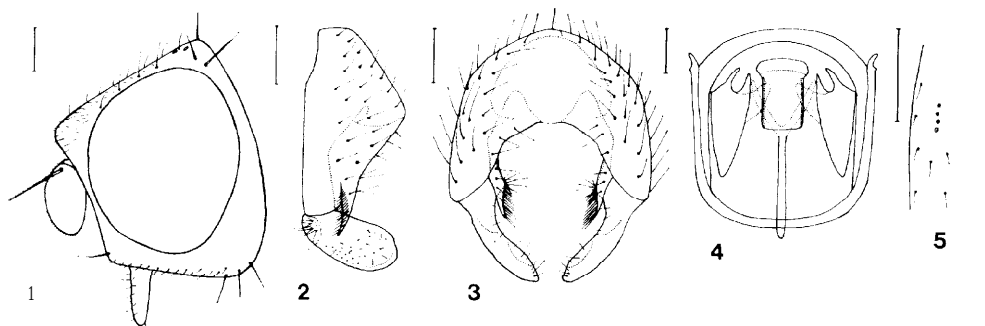
The genus *Dicraeus* is usually defined by the elongate vein r_{2+3} , which results in the second costal sector being more than twice the length of the third. Some other New Guinea Oscinellinae have an elongate r_{2+3} but these also have divergent proclinate ocellar setae. In *Dicraeus* the ocellars are upright to reclinate and parallel to convergent.

Kanmiya (1971) summarised publications on *Dicraeus* and described new species from Japan and Formosa. Deeming (1979) described species from the Afrotropical Region. Sabrosky (1950) revised the Nearctic species. Three described Oriental *Dicraeus* were included in Sabrosky (in Delfinado and Hardy, 1977) but none have been seen from New Guinea,

The genus has been recorded from every zoogeographical region except the Neotropical and Australian, but Spencer (pers. comm.) has seen undescribed Australian species. The life histories of *Dicraeus* are better known than those of most Chloropidae, the larvae being found in the developing seeds of grasses at the milky grain stage. In the Soviet Union and to a lesser degree Africa and Western Europe *Dicraeus* has some effect on the quantity and quality of pasture grasses and grain crops. Several of the New Guinea species described below are common enough to cause minor reductions in the seed production of native grasses, used as cattle pasture.

Abbreviations used in the text are: JWI, J. W. Ismay; BMNH, British Museum (Natural History), London; BPBM, B. P. Bishop Museum, Honolulu; ANIC, Australian National Insect Collection, CSIRO, Canberra; AM, Australian Mu-

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Figs. 1-5. *Dicraeus gressitti* sp. n., male. 1: head, lateral view. 2: tergite 9, lateral view. 3: ditto, apical view. 4: hypandrium, ventral view. 5: left middle femur, dorsal view.

antenna, with long dark hairs equal in length to diameter of base of arista. Face dusted bright silvery-white, concave, a faint indication of central carina extending halfway down face between bases of antennae. Eye large, reddish-brown, bare, in profile occupying almost all head, long axis slightly oblique. Gena narrower than front tibia, dusted white. Proboscis dark, palpus yellow.

Mesonotum more shining than frontal triangle, surface minutely rugose (coarser than frontal triangle) at bases of black microsetae. Mesonotum slightly longer than broad (34 : 20). Humerus black with one black seta. Notopleuron black with 1+2 strong setae. Pleurae black, shining, meropleuron dusted. Legs yellow, hind tibial organ present, long and narrow. Femoral comb (one specimen examined, fig. 5) 4 setae in a row. Wing clear with dark yellow veins, costal ratios 32 : 55 : 9 : 9. Haltere yellow. Scutellum black with surface similar to mesonotum, wider than long, convex above, apical setae well separated, arising from small tubercles. A smaller subapical pair developed.

Abdomen shining brown except for yellow tergite 1+2 and apical margins of all tergites. Setae strong, dark. Synsternite 7+8 long, convex. Tergite 9 (figs. 2, 3) short, surstylus narrower at base than apex, broad and expanded at middle, with small hairs; directed posteriorly. Cercus near base of surstylus, about half length of surstylus, inner side with long dense hairs. Hypandrium, fig. 4.

Wing length 2.3 mm.

♀: as ♂, ovipositor (fig. 43) short, cylindrical, not heavily sclerotised, with numerous hairs.

HOLOTYPE: ♂ New Guinea : NE Mt Kaindi, 2350 m, 8. ii. 1971, on *Nothofagus carri*, malaise trap, J. L. Gressitt ; paratypes, 1♂2♀♀ same data.

TYPE DEPOSITORY: BPBM, paratype also in BMNH. Two further specimens from Central Province, Wharton Range, Woitape, 20. x. 1963, D. K. Mc-

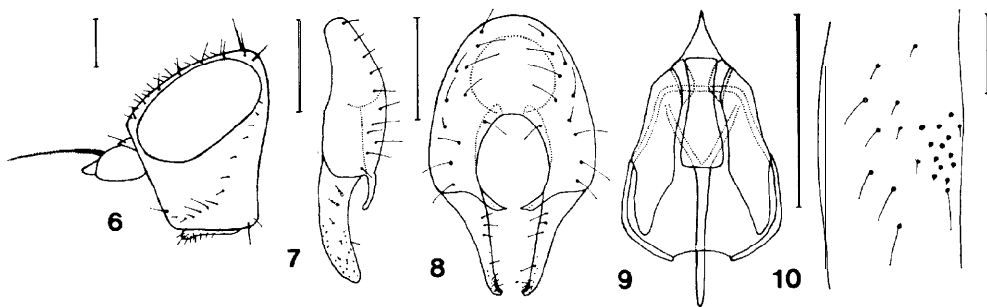
Alpine are indistinguishable from the above but are excluded from the type series because of the small number of specimens available and the high degree of endemism in the New Guinea mountain fauna.

The species is named in honour of the late Dr J. L. Gressitt for his outstanding contributions to New Guinea entomology as well as his personal help and encouragement of this study.

Dicraeus antennatus sp. n.

♂: Head (fig. 6) broader than long or deep (20 : 14 : 16). Frons as long as wide behind (14 : 14), narrowed to front, yellow, matt with sparse dark yellow microsetae and a row of longer setae along lateral margin of frontal triangle. Frontal triangle paler yellow than frons, more shining than frons but still dusted, extending $\frac{3}{4}$ length of frons. Ocellar triangle darkened, large, ocellar setae slightly convergent, reclinate. Four large orbital setae on upper orbit, several much smaller setae at front. Inner vertical proclinate, outer vertical larger, reclinate. Postvertical setae large, crossed. Longer head and thoracic setae dark yellow. Antennae small, yellow, third antennal segment with blunt shining process on anterior upper corner. Arista yellow, short, broad at base, with minute pubescence. Eye small, reddish-brown, occupying about half area of head in profile, long axis strongly oblique. Gena very wide, about half depth of eye, yellow, slightly shining, with an oblique row of large dark yellow microsetae running from vibrissal angle to above hind corner of gena, where there is another dark seta. Post gena broad at bottom of eye, narrowed to top. Face deeply concave, yellow, central carina faint.

Proboscis yellow with pale hairs, palpus small, curved, with dark hairs at tip. Occiput yellow, black at neck, black extended towards hind corners of frontal triangle.



Figs. 6-10. *Dicraeus antennatus* sp. n., male. **6:** head, lateral view. **7:** tergite 9, lateral view. **8:** ditto, apical view. **9:** hypandrium, ventral view. **10:** left middle femur, dorsal view.

Mesonotum longer than wide (29 : 18), slightly shining through dusting, yellow with black stripes. Central stripe extending from neck to level of wing-base. Intermediate stripe fused with central stripe in front of notopleural suture, separated behind, extending nearly to prescutellar seta. Lateral stripe small, above wing base. Mesonotum with sparse dark yellow microsetae. Humerus yellow with a black spot and one humeral seta. Notopleuron yellow with 1+1 setae; a tiny seta above posterior notopleural seta. Prescutellar and supralar setae well developed and a seta between them. Pleurae yellow, shining above, sternopleuron lightly dusted and almost entirely black; a small black mark on meropleuron. Legs yellow with darker hairs, hind tibial organ long, narrow. Femoral comb a small patch of reduced setae (fig. 10). Male middle tarsal segments 2-4 with thickened apical setae, those on segment 4 truncated apically. Wing whitish coloured with pale veins, costal ratios 20 : 21 : 12 : 5. Haltere pale yellow.

Scutellum wider than long (11 : 5), yellow, black at sides, with 2 microsetae on disc and two pairs of marginal setae, the apical pair upright.

Abdomen brown on disc, synsternite 7+8 yellow, tergite 9 brown, hairs dark yellow, sparse. Synsternite 7+8 short, more than four times as broad as long. Tergite 9 (figs. 7, 8) short, deep, narrowed to upper margin, surstylus slightly curved. Cercus about half length of surstylus, narrowed only near tip, directed inwards. Hypandrium, fig. 9.

Wing length 1.3 mm.

♀: as ♂, ovipositor (fig. 39) shining yellow-brown, laterally compressed, cercus blade-like with reduced setae and partial fusion of sclerites anterior to cercus.

HOLOTYPE: ♂, Papua New Guinea, Central P., Eilogo Creek, xii. 1980, JWI, grasses, (500 m); paratypes, 11♂♂, 8♀♀ same data, 1♂ Eilogo Creek, 9. xi. 1980, JWI; 2♂♂, 1♀ nr Eilogo, 21. xii. 1980, JWI; Central P., 1♀ nr Sogeri, 21. xii. 1982, JWI, grassland.

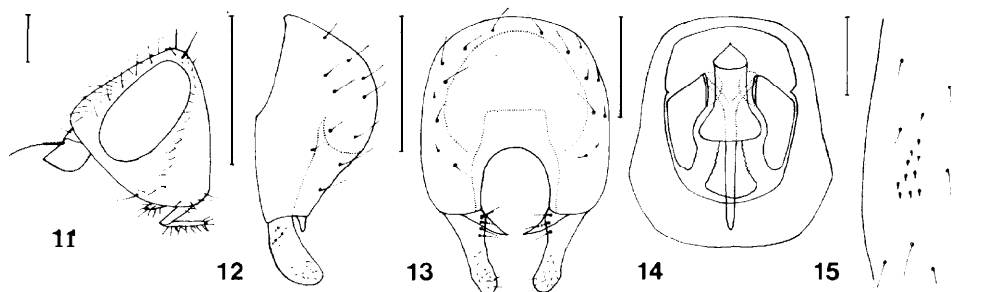
TYPE DEPOSITORY : BMNH; paratypes also in ANIC, AM, BPBM and USNM.

The species is easily distinguished by the produced third antennal segment. It is frequent in lowland grassland in Central Province, Papua New Guinea.

***Dicraeus novaehiberniae* sp. n.**

♂ : Resembling *D. antennatus* but differing chiefly as follows; head (fig. 11) broader than long or deep (18 : 13 : 14). Longer setae dark brown to black. Frons dull, dark yellow, hind margin black. Third antennal segment acute-angled at upper anterior corner but without discrete projection. Eye with long axis oblique, gena very broad.

Mesonotum and scutellum black, mesonotum with sparse microsetae and



Figs. 11-15. *Dicraeus novaehiberniae* sp. n., male. 11: head, lateral view. 12: tergite 9, lateral view. 13: ditto, apical view. 14: hypandrium, ventral view. 15: left middle femur, dorsal view.

scutellum with upright apical setae as in *D. antennatus*. Paler marks on notopleuron and behind wing base. Pleurae almost completely darkened. 1+1 notopleural setae. Middle femur with femoral comb (fig. 15) of patch of about 12 small setae. Femora largely black. Wing membrane not tinged white, costal ratios 21:21:18:5.

Abdomen brown on disc, yellow ventrally, tergite 9 black with light dusting. Synsternite 7+8 short, much wider than long. Tergite 9 (figs. 12, 13) small, dark with sparse setae. Surstylus short and strongly curved posteriorly, inner side of base with a few well developed setae, apex not excavated, rounded with short setae. Cercus short, broad at base, tip pointed, directed to mid-line of tergite 9. Hypandrium (fig. 14) with broad lower margin, aedeagus long.

Wing length 1.2 mm.

♀: as ♂, ovipositor (fig. 40) dark, heavily sclerotised, blade-like, laterally compressed, cercus almost without setae and terminal sclerites more fused than in *D. antennatus*.

HOLOTYPE: ♂ New Ireland, Lelet Plateau, 2 km N of Limbin, 4. xi. 1981, JWI, roadside grasses, 700-1000 m; paratypes, 2♂♂3♀♀, same data.

TYPE DEPOSITORY: BMNH; paratypes also in BPBM and ANIC.

Obviously most closely related to *D. antennatus* by its head structure and piercing ovipositor, this species is easily distinguished by the darker colouration, male genitalia and the more extremely modified ovipositor. Available material of this genus is too limited to draw conclusions concerning distribution patterns.

The deep gena, sparse mesonotal microsetae, erect apical scutellar setae, short synsternite 7+8 and the heavily sclerotised blade-like ovipositor set *D. antennatus* and *D. novaehiberniae* apart from the following four species.

The remaining species are best separated by their male genitalia since other characters are variable. The number of posterior notopleural setae was constant in the material studied but is known to be a variable specific

character in this genus (Deeming, 1979).

***Dicraeus longisurstylus* sp. n.**

♂: Head (fig. 16) broader than long or deep (22 : 16 : 19). Frons longer than broad (14 : 11), dark yellow, dull, slightly narrowed to front. Frontal triangle more shining than frons, about 2/3 length of frons. Longer head and thoracic setae black; 6-7 longer orbital setae. Frons microsetae small, black. Ocellar setae reclinate, parallel. Other upper head setae as in *D. antennatus*. Eye deeper than long, long axis slightly oblique, lower margin rounded. Gena narrower than in *D. antennatus*, little wider than third antennal segment is deep. Third antennal segment with strongly angled upper anterior corner. Occiput black except for margins.

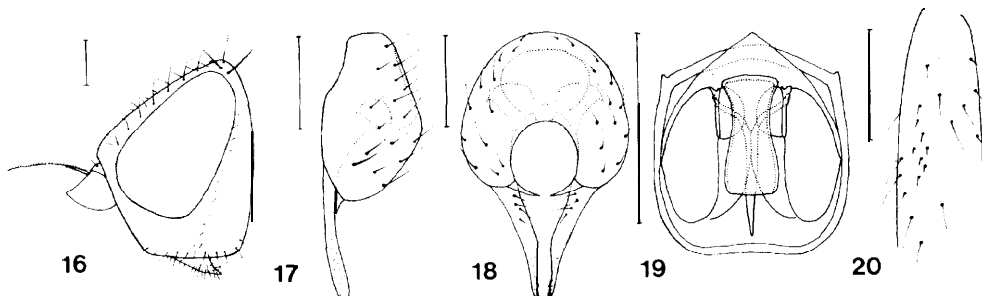
Mesonotum as broad as long (22 : 22), stripes enlarged and central three stripes fused at front, dusted. 1+2 notopleural setae. Pleurae with black marks on at least meso-, ptero- and Sterno-pleuron. All femora and 4 posterior tibiae with obscure dark markings. Femoral comb (fig. 20) consisting of a patch of 8-15 smaller, more densely placed setae, compared to other leg setae, each seta several times longer than diameter of base. Wing milky white with yellowish-brown veins, costal ratios 20 : 32 : 10 : 5.

Abdomen dull brownish above, tergite 5 yellow on hind margin. Synsternite 7+8 long, hind margin curved. Tergite 9 (figs. 17, 18) short, deep. Surstylus slender, long, narrow at base, slightly excavated on inner side at tip, longer setae at base. Cercus about 1/3 length of surstylus, narrow, pointed, bare, directed inwards. Hypandrium (fig. 19) with large aedeagus.

Wing length 1.4 mm.

♀: as ♂, ovipositor (fig. 44) short, dark, with cylindrical cercus, slightly laterally compressed but not blade-like.

HOLOTYPE: ♂ Papua New Guinea, Central P., Eilogo Creek, xii. 1980, JWI, grasses; paratypes, 3♂♂2♀♀ same data; 2♂♂1♀ Eilogo Creek, 31. i. 1982, JWT,



Figs. 16-20. *Dicraeus longisurstylus* sp. n., male. 16: head, lateral view. 17: tergite 9, lateral view. 18: ditto, apical view. 19: hypandrium, ventral view. 20: left middle femur, dorsal view.

swept grasses ; 3♂♂ 1♀ nr Eilogo, 21. xii. 1980, JWI, swept grasses ; 1♂ 1♀ National Capital District, Kanudi, 26. i. 1982, JWI, grasses.

TYPE DEPOSITORY : BMNH; paratypes also in BPBM, ANIC, AM, KONE and USN-M.

The species is most easily distinguished by the form of the male genitalia. There is variation in the degree of darkening of the frontal triangle, mesonotum and legs.

***Dicraeus kundiawae* sp. n.**

♂ : Resembling *D. longisurstylus* but differing as follows ; head (fig. 21) broader than long or deep (22 : 16 : 17).

Third antennal segment scarcely produced on upper anterior corner, more rounded than in related species, dark brown. Frons longer than broad (14 : 8). Eye rounded at front. Gena narrower than in *D. antennatus*, not wider than third antennal segment is deep. Frontal triangle darkened.

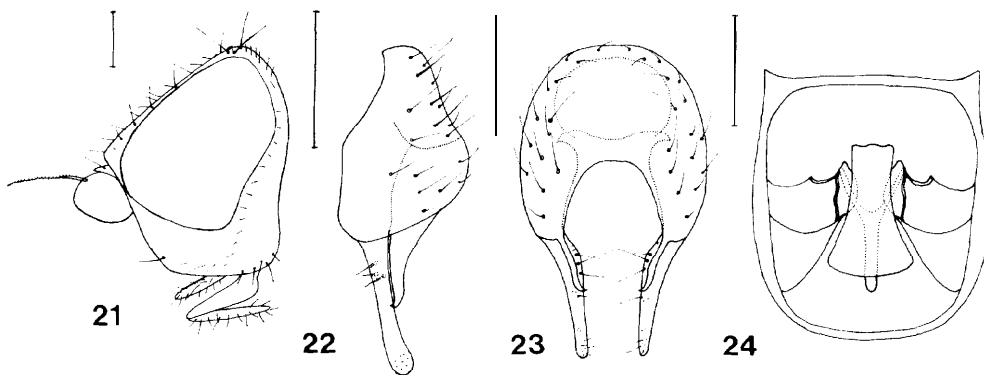
Mesonotum dusted. black except for pale spots on notopleuron and behind wing-base. 1+2 notopleural setae. Pleurae extensively darkened. Middle femur without femoral comb. Wing not tinted milky white, costal ratios 24 : 35 : 15 : 6.

Synsternite 7 + 8 long. Tergite 9 (figs. 22, 23) long, surstylus narrow in lateral and apical view, not excavated on inside at tip, with several long setae on inner side near base. Cercus 1/2 length of surstylus, narrow, inwardly hooked at tip. Hypandrium, fig. 24, aedeagus broader at tip than base.

Wing length 1.8 mm.

♀ : resembling ♂, ovipositor (fig. 42) elongate, cylindrical, black.

HOLOTYPE: ♂ NE New Guinea : Eastern Highlands (now Simbu Province), Kundiawa, 6. i. 1965, J. Sedlacek, malaise trap, Bishop Museum; paratypes,



Figs. 21-24. *Dicraeus kundiawae* sp. n., male. 21. head, lateral view. 22: tergite 9, lateral view. 23: ditto, apical view. 24 : hypandrium, ventral view.

8♂♂ 11♀♀, same data.

TYPE DEPOSITORY: BPBM; paratypes in BMNH, ANIC, AM, USNM. Further material, excluded from the type series: Papua New Guinea, Western P., Obo, 6. iii. 1981, JWI, swept grasses; Southern Highlands P., Upper Mendi Valley, Was Village, 3. xi. 1981, B. M. Thistleton, 1900 m.

This species is the darkest of those related to *D. longisurstylus* and is further distinguished by the 1+2 notopleural setae and the long, slightly hooked male cercus. It has a wide altitudinal range from just above sea level to 1900 m. There is variation in the relative width of the frons, the holotype having a narrow frons.

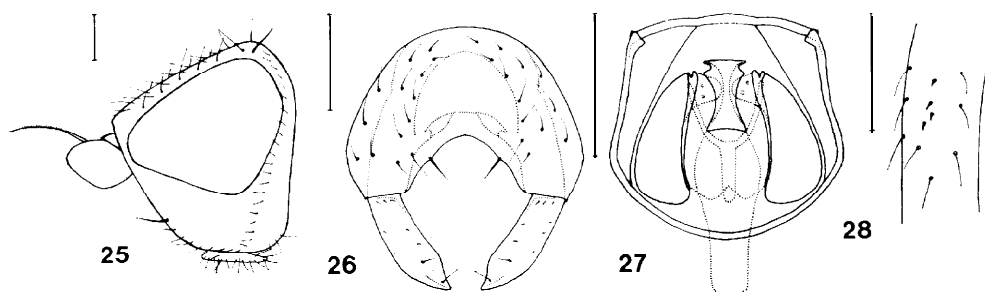
***Dicraeus oboensis* sp. n.**

♂ : Resembling *D. longisurstylus* but differing: head (fig. 25) as broad as long and not as deep (23 : 23 : 19). Third antennal segment yellow with slightly pointed upper anterior corner. Eye with straight lower margin, front corner somewhat pointed. Gena broad, flat in front, bare except for extreme lower margin, smooth and shining.

Mesonotum yellow with dusted black stripes. 1+1 notopleural setae. Pleurae shining, darkened on lower margin of meso-, most of Sterno- and part of meropleuron. Legs yellow, femoral comb (one specimen examined, fig. 28) an irregular row of 4 setae, several times longer than diameter of base. Wing membrane milky white, costa darker but other veins whitish-yellow, costal ratios 26 : 29 : 8 : 4.

Synsternite 7+8 long. Tergite 9 (fig. 26) large, broad and short. Surstylus broad, blade-like, with several longer setae at tip and shorter ones at base. Cercus apparently absent. Hypandrium (fig. 27) broad, aedeagus base small and narrowed at middle, apical portion (distiphallus) large in the specimen examined.

The distiphallus is shown in fig. 27 but is omitted from other figures.



Figs. 25-28. *Dicraeus oboensis* sp. n., male. 25: head, lateral view. 26: tergite 9, apical view. 27: hypandrium, ventral view. 28: left middle femur, dorsal view.

Wing length 1.5 mm.

♀: resembling ♂, ovipositor (fig. 45) short, broad, cercus short and cylindrical,

HOLOTYPE: ♂ Papua New Guinea, Western P., Obo, 6. iii. 1981, JWI, swept grasses; paratypes, 1♂3♀♀, same data.

TYPE DEPOSITORY: BMNH; paratypes also in BPBM and ANIC. *D. oboensis* is easily distinguished from related species by the absence of the cercus, but is similar to *D. longisurstylus* and the following species in external appearance.

***Dicraeus hirsutus* sp. n.**

♂: Resembling *D. longisurstylus* but differing: head (fig. 29) broader than deep or long (18:14:14). Third antennal segment yellow, strongly pointed at upper anterior corner,

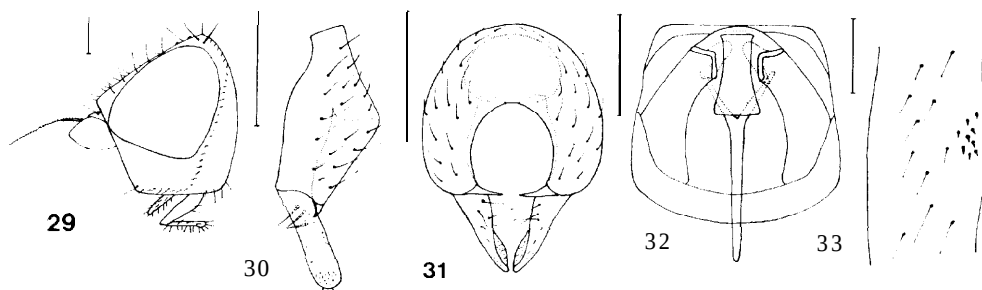
Frontal triangle yellow. Frons longer than broad (13:9). Eye with straight lower margin. Gena narrower than in *D. oboensis*.

Mesonotum yellow with dusted black stripes fused at front. Meso- and pteropleuron unmarked except in one specimen, Sterno- and meropleuron with black marks. 1+1 notopleural setae. Scutellum darkened apically. Femoral comb (fig. 33) a patch of 9-10 small setae. Wing not tinged milky white, costal ratios 17:26:9:4.

Synsternite 7+8 long, hind margin convex, disc as well as hind margin with numerous setae in 3-4 irregular rows. Tergite 9 (figs. 30, 31) short, broad, surstylus shorter than tergite 9 is deep, broad, rounded and excavated for about 1/3 length at tip on inside, basal part with long setae on inner side. Cercus long, narrow, pointed, directed inwards to mid-line. Hypandrium, fig. 32.

Wing length 1.2 mm.

♀: as ♂, ovipositor (fig. 41) elongate, cercus not compressed.



Figs. 29-33. *Dicraeus hirsutus* sp. n., male. 29: head, lateral view. 30: tergite 9, lateral view. 31: ditto, apical view. 32: hypandrium, ventral view. 33: left middle femur, dorsal view.

HOLOTYPE: ♂ Papua New Guinea, National Capital District, Saraga, 28. iv. 1981, JWI, swept grasses ; paratypes (all JWI) ; 1 ♂ Saraga, 7. v. 1981, grasses ; 1 ♂ Eilogo Creek, xii. 1980, grasses; 1 ♂ Saraga, 19. i. 1981, swept grasses ; 1 ♂ 1 ♀ Saraga, 8. vi. 1981; 2 ♂ 1 ♀ Central P. nr Sogeri, 21. xii. 1982, grassland.

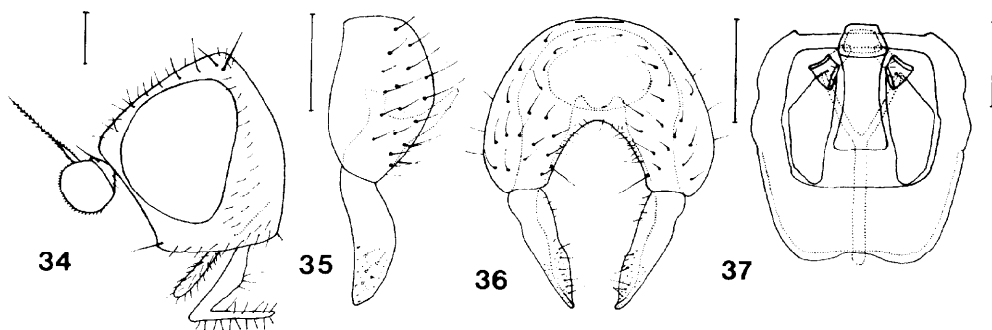
TYPE DEPOSITORY: BMNH: paratypes also in BPBM, ANIC, AM, KONE and USNM.

The species most closely resembles *D. longisurstylus* but is distinguished by the 1+1 notopleural setae, multiserial setae on synsternite 7+8 and the male genitalia.

***Dicraeus niger* sp. n.**

♂ : Head (fig. 34) broader than deep and long (24 : 17 : 17). Frons about as long as wide (15 : 15), black, dull with sparse black microsetae and a stronger row of setae on lateral margins of frontal triangle. Frontal triangle large, extending nearly to front of frons, lateral margins slightly convex, surface slightly shining through thin dust. Head and thoracic setae black. About 10 reclinate orbital setae, longer behind. Ocellar triangle scarcely raised, ocellar setae reclinate and slightly convergent, postverticals larger, upright, crossed. Inner vertical seta smaller than outer vertical. Second antennal segment brown, third antennal segment nearly black, rounded, with long pubescence. Arista short, black, hairs little shorter than basal diameter of arista. Eye dark brown, long axis strongly oblique, bare. Face slightly concave, central carina not well developed, black, dusted. Epistoma black, dusted. Gena broader than fore tibia, narrowly shining above, dusted below, black, with black setae. Postgena broad below, black, dusted. Palpi and proboscis black. Ociput black dusted.

Mesonotum elongate (32 : 27), lightly dusted, black, with dense short black microsetae. 1 humeral seta, 1+2 notopleural setae, 1 supralar, 1 prescutellar.



Figs. 34-37. *Dicraeus niger* sp. n., male. 34: head, lateral view. 35: tergite 9, lateral view. 36: ditto, apical view. 37: hypandrium, ventral view.

Pleurae shining black, dusted on propleuron, upper mesopleuron, upper pteropleuron and meropleuron. Legs elongate, black, lightly dusted, hind tibia swollen and shining centrally, hind tibial organ long, slit-like. Femoral comb absent. Wing elongate, infuscated, long veins nearly straight, costal ratios 33 : 60 : 21 : 9. Haltere long, darkened.

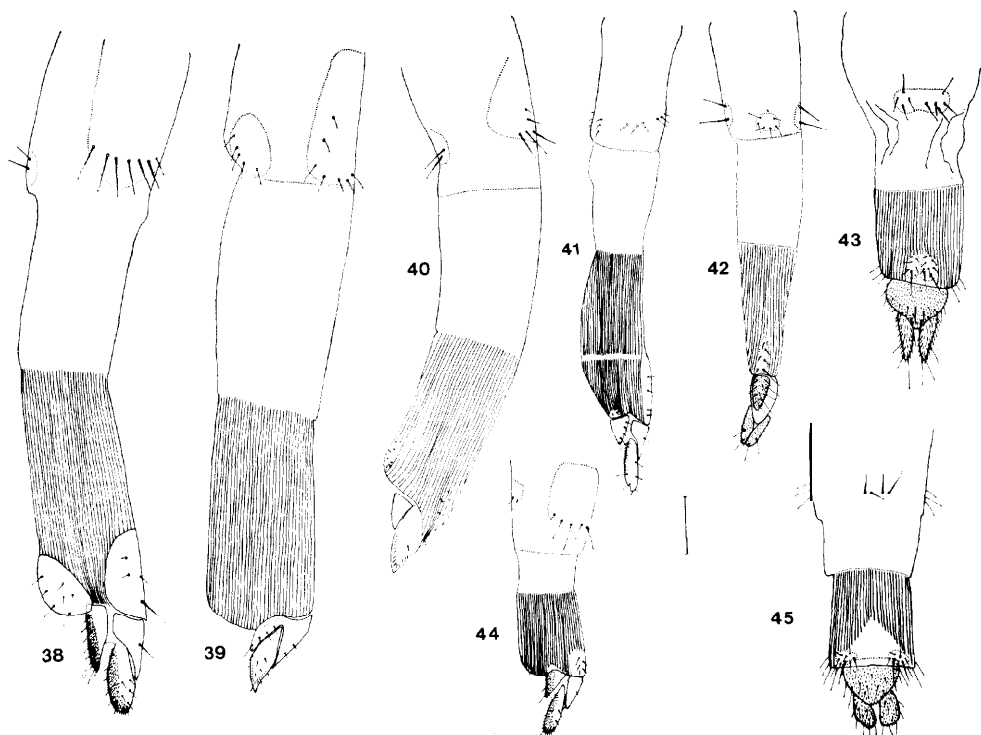
Scutellum broader than long, black, lightly dusted, microsetae on disc numerous, dark, 2 pairs of marginal setae.

Abdomen elongate, black, dusted, with long black setae. Synsternite 7+8 much sclerotised, black, nearly as long as broad, convex. Tergite 9 (figs. 35, 36) large, black. Surstylus long, broad, curved, about twice as long as broad, without long hairs at base, directed ventrally. Cercus absent. Hypandrium (fig. 37) heavily sclerotised, black, lower margin very broad.

Wing length 2.8 mm.

♀: as ♂, ovipositor (fig. 38) long, slightly laterally compressed but cercus cylindrical with numerous hairs, black.

HOLOTYPE: ♂ Papua New Guinea, Simbu P., Lake Piunde, 1. viii. 1982, JWI,



Figs. 38-45. Ovipositors. 38: *Dicraeus niger* sp. n. 39: *D. antennatus* sp. n. 40: *D. novae-hiberniae* sp. n. 41: *D. hirsutus* sp. n. 42: *D. kundiawae* sp. n. 43: *D. gressitti* sp. n. 44: *D. longisurstylus* sp. n. 45: *D. oboensis* sp. n. Figs. 38-42 and 44, lateral view. Figs. 43 and 45, dorsal view.

3600 m, forest edge ; paratypes 13♂♂ 13♀♀, same data.

TYPE DEPOSITORY: BMNH: paratypes also in ANIC, AM, BPBM, USNM, KONE.

The entirely black colouration and infuscated wing easily distinguish this species.

Discussion

The species described here fall into three or four ill-defined groups. *D. gressitti* and *D. niger* are darker than the remaining species and do not appear related to them or to each other. Since both are from the montane or upper montane zone and the other species are from lower elevations, they may possibly represent a Palaearctic element in the fauna. As noted before, *D. antennatus* and *D. novaehiberniae* appear closely related, but they have very different male genitalia; this is not an uncommon feature in Chloropidae. The African *D. ibadensis* Deeming also has a blade-like ovipositor and angled upper anterior corner of the third antennal segment. The remaining species described here (*D. longisurstylus*, *D. kundiawae*, *D. oboensis* and *D. hirsutus*) are small, partly yellow species near to *D. antennatus*, but with cylindrical female cerci. Similar small yellow species, some with angled third antennal segment or blade-like ovipositor, are now known from the Afrotropical Region, Formosa, Japan and New Guinea. If they occur in the remainder of the Oriental Region they may be throughout the Old World tropics. As Deeming (1979) notes it is difficult to subdivide the genus. The male genitalia are very varied and may be a poor guide to relationships.

Acknowledgements

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